

Remarks

Applicant requests reconsideration of the application in view of the remarks below.

Telephone Interview

Applicant's representative conducted a telephone interview with Examiner Hannon on April 9, 2009. The substance of the interview is discussed below.

Rejection under 35 U.S.C. § 103(a)

The Office action rejects claims 1, 2, 6-11, 13, 16, 18, and 19 under 35 U.S.C. § 103(a) over U.S. Patent No. 5,660,482 (Newley) in view of GB Patent No. 2,170,279 (Harrison). This rejection is respectfully traversed for the reasons set forth below.

Claim 1 concerns a self-lubricating bearing having a self-lubricating liner and a counterface surface in close sliding contact therewith, the counterface surface having a surface finish of less than 20 nm and a hardness of less than in the region of 1000 VPN. The action alleges that the chromium plated inner surface 2 of Newley's bearing constitutes a self-lubricating liner. The action states that because the chromium plating is provided "to avoid galling between the cooperating surfaces," the chromium plating is therefore a self-lubricating liner under the broadest reasonable interpretation of the term. Applicant disagrees.

A "self-lubricating" bearing liner is a term of art that must be construed as would be understood by one skilled in the art. As was pointed out by Applicant's representative in the telephone interview, for a material to be "self-lubricating," it must be capable of providing a substance which forms a film of lubricant between two bearing surfaces. One example of a self-lubricating material disclosed in the present application is PTFE. In use, some of the PTFE material is removed from the liner, due to abrasive wear, and deposited on the opposing bearing surface to form an additional film of PTFE material thereon. Subsequent wear is thus much decreased and is known as "adhesive wear."

Attached hereto as Exhibit A is a description of self-lubricating bearings from Kempe's Engineers Year-Book (1998), which describes several examples of self-lubricating bearings. As described in this reference, metal bearing liners, such as bronze liners, must be combined with a lubricant, such as by impregnating the bronze with filled PTFE. Also, reference can be made to the Background section of U.S. Patent No. 7,320,549 for a brief description of conventional bearings (which require a lubricant such as grease) and self-lubricating bearings (in which a layer of lubricant is provided by the lining material itself). Examples of convention materials from which self-lubricating

bearings are made include “copper alloys such as bronze, aluminum bronze, manganese bronze and hardened steel and steel-backed copper alloy structures.” To impart lubricating properties to the bearing, the surface of the metal is provided with pockets or cavities into which a lubricating component is held. In use, a thin layer of the lubricating material is distributed from the pockets or cavities between the bearing surfaces. See col. 1, lines 54-63 of the ‘549 patent.

Also attached as Exhibit B is the entry for the term “Lubrication” from The New Encyclopedia Britannica, 15th Edition, which describes several types of solid lubricants. As described in this reference, soft metals, such as lead, tin and indium, placed on a hard substrate can act as effective lubricants. See page 171.

By comparison, chrome itself (as used in Newley) is not a self-lubricating material. Instead, chrome is a very hard substance and if chrome particles were to break free from either surface, they would scratch and destroy the bearing surfaces, rather than form a lubricating layer as required of a self-lubricating bearing. As is well known in the art, a chrome bearing would require the provision and periodic replenishment of grease, oil and/or dry film lubricant, because chrome is not self-lubricating.

In short, the claim term “self-lubricating liner” in claim 1 must be given its meaning within the art; that is, a liner that creates a layer of lubricating material between the two bearing surfaces. Because the chrome plating of Newley is not a self-lubricating liner, Newley does not meet the limitations of claim 1. Harrison also does not teach or suggest a self-lubricating liner. For at least these reasons, claim 1 is not obvious over the combination of Newley and Harrison, and this rejection should be withdrawn.

Claims 2 and 6-8 depend from claim 1 and are thus nonobvious over Newley and Harrison for at least the same reasons claim 1 is nonobvious, and because each dependent claim recites a distinctly patentable combination of features.

Independent claim 9 concerns a method of constructing a self-lubricating bearing comprising providing a self-lubricating liner in sliding contact with a counterface surface having a surface finish of less than 20 nm and a hardness of less than 1000 VPN. Neither Newley nor Harrison teaches or suggests a bearing having a self-lubricating liner. Hence, claim 9 is not rendered obvious by Newley or Harrison (alone or in combination), and the rejection of claim 9 should be withdrawn.

Claims 10, 13, 16 depend from claim 9 and are nonobvious over Newley and Harrison for at least the same reasons claim 9 is nonobvious, and because each dependent claim recites a distinctly

patentable combination of features.

Independent claim 11 concerns a method of operating a self-lubricating bearing having a self-lubricating liner in sliding contact with a counterface surface having a surface finish of less than 20 nm and a hardness of less than 1000 VPN. Neither Newley nor Harrison teaches or suggests a bearing having a self-lubricating liner. Thus, claim 11 cannot be obvious over Newley and Harrison and the rejection of claim 11 should be withdrawn.

Claims 18 and 19 depend from claim 11 and are thus nonobvious over Newley and Harrison for at least the same reasons claim 11 is nonobvious, and because each dependent claim recites a distinctly patentable combination of features.

Accordingly, applicants respectfully request that the rejections under 35 U.S.C. § 103(a) over Newley and Harrison be withdrawn. The Examiner is invited to telephone the undersigned attorney at the telephone number provided with any questions regarding this response.

Respectfully submitted,

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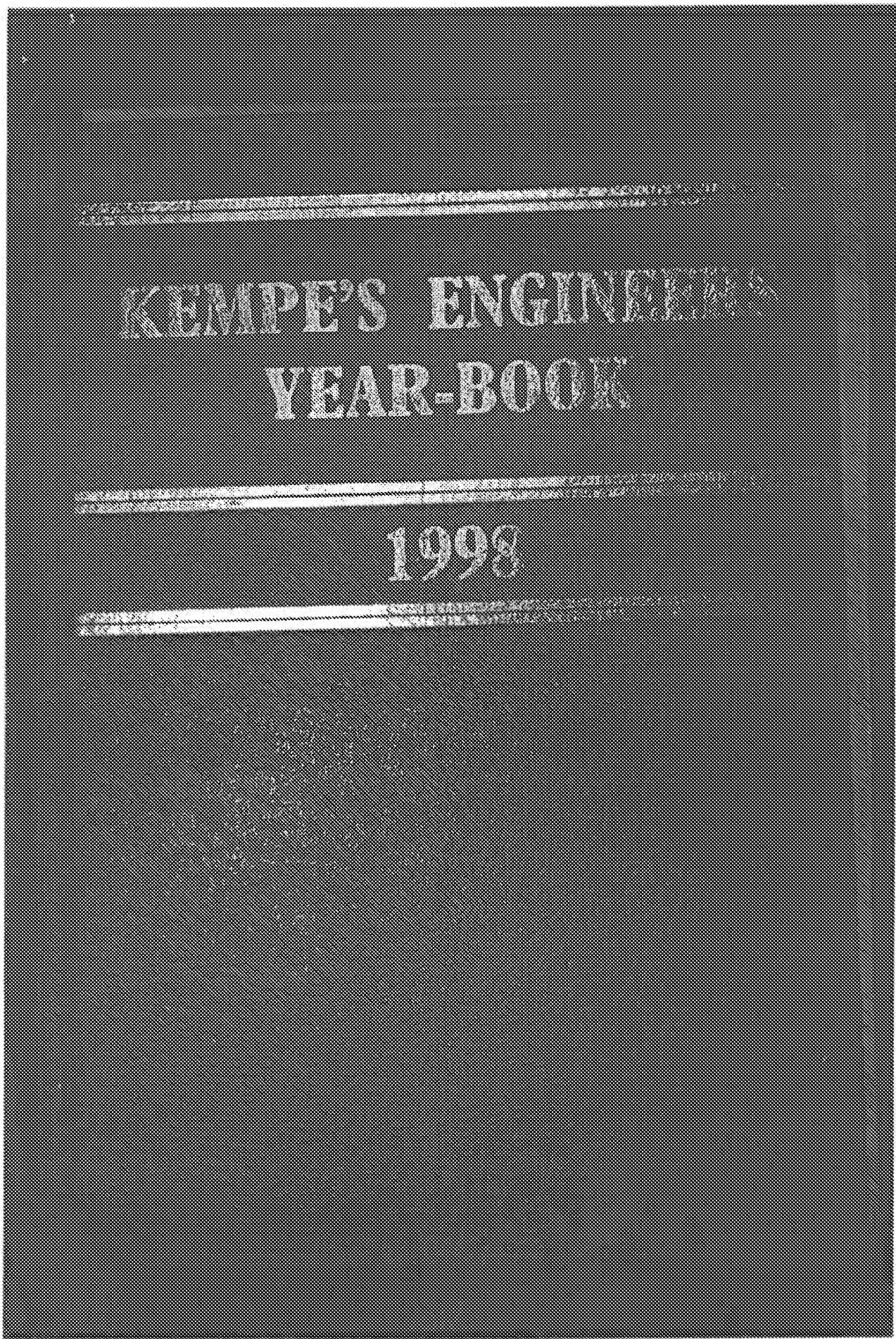


EXHIBIT A

AlliedSignal has developed bearing structures in **3** sizes on their **3** production lines. These plastic bonded bearings have been used in aircraft applications with a full range of flight conditions.

Solid Lubricating Bearings. The idea of lubricating a bearing without oil or grease was first proposed by **Glacier** in 1972 and **maintenance-free** bearings. One example of these bearings is the **Glacier PTFE** bearing. This bearing has been on the market for over 35 years and have proved very successful in many applications. The friction properties of PTFE with high compressive yield strength (up to 300 MPa) located between two surfaces are unique. Compared with U-26 for PTFE, and especially the solid lubricant, the **Glacier** bearing has a higher hydraulic load and give the low static surface friction demanded for a comfortable vehicle ride.

Woven PTFE fibres with glass or textile fibres resin bonded to a steel backing (Aramid Fibre Reinforced Plastic) are also effective for low speed / very high load applications such as aircraft airframe bearings where operation is at ambient temperature -50°C to $+200^{\circ}\text{C}$ is required. Dry friction coefficient values of 0.04 are found with bearing load $100\text{--}1000 \text{ N/mm}^2$. The compressive yield strength of these materials is up to 1000 MPa. Other ways of combining the polymer with metal are by pressure dry lubricant into the pores of woven metal wire mesh (Metallized, UltraTech) or perforated metal sheet (HY-Load). Metallic dry bearings are also made by moulding and sintering mixtures of powdered metals and carbon/graphite powder.

The use of a porous metal sinter to bond a bearing plastic to a bearing housing limit with polyacetal or filled PEHK (poly ether ether ketone). These materials have long life and can be used as greased-solid lubricants. They are also suitable for bonded white metal for temperatures up to 120°C in the case of polyacetal (Gleitmetall, Hycarb).

It is at very low temperatures below -30°C and high temperatures above 200°C that these materials become ineffective. At present they have been limited to temperatures up to 100°C or higher.

Conclusions. An increasingly popular method of dry lubrication is to use a solid polymer

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William Benton, Publisher, 1943-1973
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In 1970, 38 percent of the city's total waste came from its citizens from the activities of its home, and Little Rock residential food accounted for its largest portion. Residential wastes represent approximately one-third of the total waste industry's overall annual tonnage. Residential wastes include non-combustion wastes, containers, wood and paper products, clothing, electronic components, deteriorated or deteriorating furniture, and food processing seeds for residential use, and food processing.

erites of the horizon can be observed. Densely tubular structures suggest a significant portion of the horizon was deposited and subsequently covered during the early stages of marshy conditions and displays of meadow soils.

Sediments: Soils, such as peat soils and wetland soils, develop over water, moist soil environments, and possess sufficient moisture to bind soil particles together. Peat indicates wet land environments, such as swamps, ponds, and bogs, and some areas contain iron oxides as distinct features in some peatland materials (see below, Section 3.2).

EDGECROFTS (EDGECROFTS)

Edgcrofts is a relatively recently developed residential area, located in the northern part of the town. The area is bounded by the River Lee to the west, the A10 road to the north, the A1020 road to the east, and the A1034 road to the south. The area is characterized by its mix of modern residential developments, including large detached houses, smaller semi-detached houses, and terraced houses. It also contains several industrial units and commercial premises, including a large supermarket and a number of smaller retail outlets. The area is well served by public transport, with regular bus services connecting it to the rest of the town and surrounding areas. The area is also accessible by road, with the A10 and A1034 providing links to the M1 and M25 motorways respectively.

• Fiber softening A smooth core of the initial processes of hibernation, during the last months before, in some species, "wintering," to perform hibernation and subnivean hibernation, especially of coniferous trees, shrubs and evergreen, especially of seedlings, seedlings and young plants, which are classified as hibernant, and frequently is characterized by a short, thick, pale, non-vascularized tissue or layer of insulation, very thin, which is frequently substituted for snow, which is much lower fraction of a good as an insulating material for difficult situations.

Age	Number seen	Percent seen
0-10	1,125	45.88
11-20	455	18.75
21-30	400	16.00

Such developments of a whole variety of products, the specific technological needs of which are not yet fully understood, have led to the need for a more detailed analysis of the market situation in some countries.

Industrialization. Industrialization has been a major factor in the development of modern society. It has transformed agriculture from a primary sector to a secondary sector, and has created a large number of jobs in the tertiary sector. The industrial revolution began in England in the late 18th century, and spread to other countries over time. The industrial revolution was driven by technological advancements such as the steam engine, the cotton gin, and the power loom. These technological advancements led to increased efficiency and productivity in manufacturing, which in turn led to economic growth and urbanization. The industrial revolution also led to social changes such as the rise of the middle class, the development of a capitalist economy, and the emergence of a working-class. The industrial revolution had both positive and negative effects on society. On the one hand, it provided many people with employment opportunities and improved their living standards. On the other hand, it also led to social inequality, environmental degradation, and social unrest. The industrial revolution continues to influence modern society through its impact on technology, economics, and politics.

institutions. Participating in field trips that involve expenses is generally covered by the fee of admission to the institution. Participants are responsible for their own transportation, food, and lodging expenses. Participants must be at least 18 years old or have a parent or guardian sign a release form.

the crested wattle or the broad-leaved wattle, the latter being the more common. The flowers are yellow, and the fruit is a pod containing two seeds. The plant is a shrub, 10-15 ft. high, with a trunk 4-6 in. in diameter. It is found in open grassy places, particularly near watercourses, and is often seen growing on sandstone ridges. The wood is hard and durable, and is used for fence posts, etc. The bark is used as astringent, and the leaves are eaten by cattle.

aspect of horizontal stratification, the ambient temperature and the penetration for chemical erosion. To a lesser extent, the type of substrate often affects stratification. The role of rockous substrates in stratification has been

real source, the system is said to be *closed*. If the processes between the system and its environment are reversible, however, the system is *isothermal*.

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THE JOURNAL OF CLIMATE

Private, Aborigines served at the Battlefront in 1914-1918. In 1922-1923, they conducted 1,000 raids on the coastal areas of British Columbia. The Indian parts of which areas became known as the Pacific Northwest.

and Karpovka. Photo 1792, considerably reduced. See it in the first plate published by the French in 1811 to 1813. The river rises from the Germanic coal belt of the Donets basin. Photo 1793, reduced. A branch of the Donets, flowing into the Dnieper. Photo 1794, reduced. A branch of the Donets, flowing into the Dnieper.

The leading mercantile firm of St. Paul was founded by George C. Englehardt in 1856. The company became known as Englehardt & Company, and the firm was incorporated in 1863. The city experienced rapid growth during the 1860s, especially after the Civil War, due to the opening of the St. Paul & Pacific Railroad. This led to a large influx of immigrants from Europe, particularly Germany, Ireland, and Scotland. The city's population grew from about 10,000 in 1860 to over 100,000 by 1870. In 1871, the Great Fire of St. Paul destroyed most of the city, but it was quickly rebuilt. The city continued to grow and develop, becoming a major center for agriculture, industry, and commerce. It became the state capital in 1877, and the seat of Ramsey County in 1883. The city's economy was based primarily on agriculture, with wheat and corn being the main crops. The city also had a significant timber industry, with many mills processing lumber from the surrounding forests. The city's location on the Mississippi River made it a major port, and it became a hub for trade and transportation. The city's early history was shaped by its natural resources and its strategic location at the confluence of the Mississippi and Minnesota Rivers.

After the end of World War II, the industrial plants moved part of the industry to Japan. In 1950, the Japanese government established the Industrial Bank of Japan. After the end of World War II, the industrial plants moved part of the industry to Japan. In 1950, the Japanese government established the Industrial Bank of Japan.

The city center, however, failed to prove very attractive for the opening of the first branch of the Bank of America in 1960. The branch, located at 1000 Main Street, was the second to open in the city after the First National Bank, which had opened in 1956. The branch was established by the First National Bank in 1960, and it became the first branch of the Bank of America in the city. The branch was located at 1000 Main Street, and it became the first branch of the Bank of America in the city. The branch was located at 1000 Main Street, and it became the first branch of the Bank of America in the city.

Commoner, it had representative government by 1536. The city became the 1st to undergo the Protestant Reformation (1539-40). The city was the headquarters of Sir Francis Drake during the Spanish Armada, and the reformist Sir John Whitgift, Bishop of Canterbury, was responsible for its conversion. It was the home of Sir Walter Raleigh, and the residence of the Bishops of Winchester and Durham.

the rebels to the south, among the forces of the Habsburg League (1618-30), had no lasting effect. After the final breakdown of the League in 1648, one still needs to retain its position as the most important barrier on the battle front. It was able to resist the Parliamentary forces for nearly twenty years. The very difficult terrain of the Highland (see Geography) was an important factor in this.

mainly political controls — as aristocratic hereditary owners of the ⁷ 7 percent were in the ⁷ Block in the target publics of Cambridge, Boston, and New Haven. But there was also some participation by other groups, such as the French, which was not very large.

